

Causalgia After Cervical Discectomy

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=국문초록=

경추 추궁절제술후 발생한 Causalgia

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49세 여자 환자가 경부 추간판 탈출증의 치료를 받기위하여 전신 마취하에 우측의 추궁 절제술과 전방 추체간 접합술을 받고난 즉시 회복실에서 부터 양측 상지에 작열통이 발생하였다. 환자는 양측 상지에 전형적인 작열통의 증상인 allodynia, 통각 과민(hyperalgesia), 통각 이상 과민증(hyperpathia)을 보였으며 특히 우측 상지에는 심한 부종을 보이고 있었다. 환자는 일련의 성상 신경절 차단과 disposable Daymate™ portable elastomeric infusor를 이용한 연속적 상완신경총 차단으로 작열통이 완치되었다.

Key Words: Causalgia, Stellate ganglion block, Continuous brachial plexus block

INTRODUCTION

Causalgia is a painful disorder associated with nerve injury and in most cases the injury is due to a high-velocity missile. The pain is almost always burning in nature and develops rapidly or soon after injury which is a contrast pattern to that observed with reflex sympathetic dystrophy in which the pain usually develops after several weeks or months¹⁾. It is unusual for the patient who underwent cervical discectomy to contract causalgia, although there is always a possibility of partial major nerve by surgical maneuvers such as traction or retraction of the brachial plexus. Moreover, causalgia

occurs much less frequent than reflex sympathetic dystrophy, although it represents and manifests the most severe form of reflex sympathetic dystrophy. Therefore, we think it is worthwhile to describe a patient with causalgia who developed the symptoms, and that bilateral symptoms immediately after cervical discectomy, or on emerging from inhalational anesthesia.

CASE REPORT

A 49 year old female patient visited the Department of Neurosurgery with the chief complaint of motor weakness and tingling sensation of both lower extremities for about 5 months.

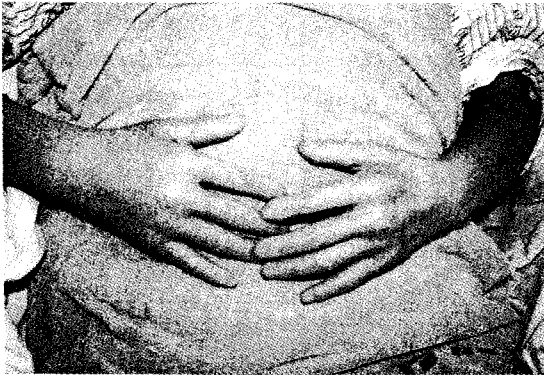


Fig. 1. A 49 year old female patient who developed bilateral allodynia, hyperalgesia, hyperpathia immediately after cervical discectomy on the right side. Both hands show edematous change with the right side more remarkable.



Fig. 2. Two weeks after treatment with bilateral stellate ganglion block and initial continuous brachial plexus block of the right side. All symptoms and signs of causalgia diminished with marked reduction in edema of the right hand.

Neurological examination revealed the motor weakness in dorsiflexion of both great toes. Sensory was intact and other neurological signs including straight leg raising test, Naffziger sign, Payton's sign, Patric's sign were negative. Laboratory examinations were also normal. Multiple herniated cervical disc and focal myelomalacia at C4-5 level were diagnosed by cervical myelography and computerized tomography scanning, and the patient was scheduled to perform cervical discectomy. No premedication was done and anesthesia was conducted with usual inhalational anesthesia method with isoflurane. Muscle relaxation was obtained by succinylcholine chloride and pancuronium. The surgeons made an incision anteriorly on the right side with the patient supine position and removed disc materials from C5-6 and C6-7 intervertebral spaces and the disc were filled with the biocompatible polymer for interbody fusion. The whole procedure was finished without any significant problems. On emerging from anesthesia at the recovery room, the patient complained of severe burning pain on both

hands and intolerated the slightest touch by surroundings. The patient was consulted to the pain clinic after two days of conservative treatment. Physical examination revealed edematous change of both hands with the right hand more remarkable(Fig. 1) and there was marked allodynia, hyperalgesia, and hyperpathia on both hands. Bilateral stellate ganglion blocks were given at one hour interval for the other side block. Next day, brachial plexus block of the right side was given in addition to stellate galglion blocks because the patient still complained of severe pain and hyperesthesia on the edematous right hand. On the third day, continuous brachial plexus block of the right side was performed using epidural catheter which was inserted into the neurovascular sheath through Tuohy needle via axillary route together with bilateral stellate ganglion blocks. We filled the Daymate™ portable elastomeric disposable infusor, which was designed to deliver 2 ml of any drug solution per hour, with 100 ml of 0.125 % bupivacaine and connected to the catheter. After 4 stellate ganglion blocks, edema was

almost completely subsided and there was no pain on the left side. But the right hand was still edematous and the patient complained of mild pain and irritation of the brachial catheter. So we removed the catheter and gave two more stellate ganglion blocks on the left side. After 2 weeks of treatment, all symptoms and signs improved and we finished the treatment (Fig. 2). By that time, a total of 11 stellate ganglion blocks for the right side, and 6 blocks for the left side were given.

DISCUSSION

Painful disorders associated with injury of peripheral nerves which are recognized as causalgia have been described under various terminology such as causalgia, minor causalgia, post-traumatic vasomotor disorders, Sudek's atrophy, post-traumatic painful osteoporosis, and various other terms¹⁾. Bonica¹⁾ suggested that it be considered a manifestation of the same underlying mechanism and pathophysiology and be given the all-inclusive generic term of "reflex sympathetic dystrophy" because all of these conditions had strikingly similar features and probably similar underlying mechanisms, and because pain and most other symptoms are alleviated or modified by sympathetic interruption. Members of the International Association for the Study of Pain (IASP) subcommittee on taxonomy believe that the term causalgia should be reserved for the classic syndrome and that the term reflex sympathetic dystrophy should be used for symptoms that are similar but are not due to major nerve injury²⁾. Long³⁾ also clearly made the distinction between causalgia and reflex sympathetic dystrophy. Causalgia is secondary to partial injury to major mixed nerves, caused by low- or high-velocity missiles, and manifests as trophic changes in

the distribution of the nerve associated with extreme hypersensitivity. When the injury is associated with a high velocity missile, hydrostatic effects caused by shock waves should be considered as well as direct tissue damage. A high velocity missile can cause damage not only to the actual tissue that has been penetrated, but also to surrounding tissue as a result of hydrostatically transmitted shock waves. Therefore the pain seems to persist more than 5 to 6 weeks, which seems to be the length of time needed for surrounding tissue to recover from injury⁴⁾. During World War II, one to five per cent of patients with peripheral nerve injury developed causalgia, although some authors apparently found the incidence to be higher up to 13.8 per cent¹⁾.

Most patients contracting causalgia experience burning pain immediately, or within the first week of injury. Of 662 published cases in which accurate data on the time of onset of pain were found, 37% experienced pain immediately, 26% in the first day, 19% during the second to seventh day, 13% during 7 to 30 days, and 5% developed pain in a month or more after injury¹⁾. Our patient also developed pain immediately after injury, that is, on emerging from anesthesia and this is consistent to the majority of cases.

The characteristic clinical features of causalgia included almost always allodynia, hyperalgesia and hyperpathia and the pain is usually aggravated by a variety of physical and emotional factors. Vasomotor and sudomotor disturbances of varying degrees, and trophic changes frequently occur later in the course of the disease¹⁾. A clinically important feature of causalgia is that interruption of all sympathetic pathways to the affected limb early in the course of the disease produces dramatically prompt and complete relief of most of the symptoms in

most patients^{5,6}. The possibility of contralateral sympathectomy has been raised for causalgia which is not responding to sympathectomy⁷. This needs the postulation of the existence of crossed sensory sympathetic fibers, to which the symptoms of contralateral limb of our patient might be attributable. We interrupted all sympathetic pathways by performing bilateral stellate ganglion block and continuous brachial plexus block of the affected side early enough in the course of the disease with excellent result. On the contrary to the positive responses to sympathectomy, Raja et al⁸. reported that sympathetic blocks did not relieve the pain. Ochoa⁹ also described a small subset of patients with causalgia or reflex sympathetic dystrophy in whom sympathetic blockade had no effect or made the pain worse. In some patients with nerve injuries, the sympathetic nervous system is not involved and sympathetic blockade is ineffective. This is referred to as sympathetically independent pain(SIP) contrast to sympathetically maintained pain(SMP) in which the sympathetic nervous system is directly involved and its interruption completely relieves the symptoms¹⁰. With positive responses to sympathetic blocks, surgical sympathectomy would be suggested³. Medical sympathectomy may be possible with phenoxybenzamine with the maximum dosage of 40~120 mg/day for 6~8 weeks¹¹, or with regional intravenous guanethidine¹².

Other effective modalities for the treatment of causalgia have been reported with variable success rate. They include dorsal root entry zone(DREZ) lesions, in which radiofrequency microlesions are placed in the dorsal horn in the region where the roots have been torn from the spinal cord¹³, transcutaneous electrical nerve stimulation(TENS)¹⁴, physical therapy¹⁵, cryotherapy in the form of application of cold in the

very small percentage of patients who present aggravation of the symptoms by heat⁹. Clonazepam has been reported to be effective for burning pain¹⁶. Oral propranolol has also been reported to be successful in relieving causalgia¹⁷.

In summary, we experienced a patient who developed classic symptoms of causalgia bilaterally due to brachial plexus injury by surgical procedure of cervical discectomy and anterior interbody fusion in the right side, and we treated the patient successfully with serial bilateral stellate ganglion blocks and continuous brachial plexus block of the right side.

참 고 문 헌

- 1) Bonica JJ. *The management of pain*. 2nd ed, Philadelphia: Lea & Febiger. 1990; 220-243.
- 2) Merskey H. *Classification of chronic pain: Descriptions of chronic pain syndromes and definitions of pain terms*. Pain 1986; (Suppl. 3) S28.
- 3) Long DM. *Pain of peripheral nerve injury*. In: Youmans J. *Neurological Surgery*. 2nd ed, Philadelphia: WB Saunders. 1982; 3634-3643.
- 4) Hendler N. *reflex sympathetic dystrophy and causalgia*. In: Tollison CD. *Handbook of chronic pain management*. Baltimore: Williams & Wilkins 1988; 444-454.
- 5) Procacci P, Maresca M. *Reflex sympathetic dystrophies and algodystrophies: Historical and pathogenic considerations*. Pain 1988; 31: 137-146.
- 6) Bonica JJ. *Causalgia and other reflex sympathetic dystrophies*. In: Bonica JJ, Liebeskind JC, Albe-Fessard. *Advances in pain research and therapy*. vol 3. New York: Raven Press. 1979; 141-166.
- 7) Kleiman A. *Causalgia: evidence of the existence of crossed sensory sympathetic fibers*. Am J Surg 1954; 87-839. In: Tollison CD. *Handbook of chronic pain management*. Baltimore: Williams & Wilkins 1988; 444-454.
- 8) Raja SN, Campbell JN, Mayer RA, et al. *Sensory testing in patients with causalgia and reflex sympathetic dystrophy*. Abstract presented at 6th Annual Meeting of the American Pain Society, chronic pain management. Baltimore: Williams & Wilkins

- 1988; 444-454.
- 9) Ochoa J. *The newly recognized painful ABC syndrome! Thermographic aspects. Thermology 1986; 2: 65. In: Bonica JJ. The management of pain. 2nd ed, Philadelphia: Lea & Febiger. 1990; 220-243.*
 - 10) Roberts WJ. *An hypothesis on the physiological basis for causalgia and related pains. Pain 1986; 24: 297-311.*
 - 11) Ghostine SY, Comair YG, Turner DM, et al. *Phenoxylbenzamine in the treatment of causalgia (report of 40 cases). J Neurosurg 1984; 6: 1263-1268.*
 - 12) Hannington-Kiff JG. *Relief of causalgia in limbs by regional intravenous guanethidine. Br Med J 1979; 2: 367-368.*
 - 13) Payne R. *Neuropathic pain syndromes, with special reference to causalgia and reflex sympathetic dystrophy. Clin J Pain 1986; 2: 59-73.*
 - 14) Meyer GA, Fieldsa HL. *Causalgia treated by selective large fiber stimulation of peripheral nerve. Brain 1972; 95: 163. In: Bonica JJ. The management of pain. 2nd ed, Philadelphia: Lea & Febiger. 1990; 220-243.*
 - 15) Omer G, Thomas S. *Treatment of causalgia: A review of twenty eitht treated cases at Brooke General Hospital. Texas Med 1971; 67: 93. In: Bonica JJ. The management of pain. 2nd ed, Philadelphia: Lea & Febiger. 1990; 220-243.*
 - 16) Bouckoms AJ, Litman RE. *Clonazepam in the treatment of neuralgic pain syndrome. Psychosomatics 1985; 26: 933-936.*
 - 17) Simpson G. *Propranolol for causalgia and Sudek atrophy. JAMA 1974; 227-237.*